On a rainy day, a student saw a rainbow in the sky. It's colours were arranged in circular
He developed the interest to know how this occurred. When the school organized a scien
fair, he decided to make his presentation on rain bow formation.

Task

Having studied physics;

a) Help the student to know which materials to use in setting up the experiment

b) Advise the student on how to arrange the apparatus given to form the rainbow.

SECTION B

Item 4

The ministry of health wishes to transport a vaccine whose effectiveness greatly depends on its temperature from National Medical Stores (NMS) in Kampala to Kigumba Health centre (IV) using its true trucks.

Kigumba is located 200km away from NMS and trucks move at an average speed of $80kmh^{-1}$. The vaccine is only effective when its temperature is between 96°C - 260C. In this range, the vaccine is in liquid state.

In order to regulate the temperature, the vaccine is put in a very thin container which is then placed in water bath of mass 2.5kg. The water bath and the vaccine are at 96°C before departure. The temperature of the water in the bath drops at 1°C/min and the water takes 8 minutes to freeze. When frozen, its temperature drops at 0.5°C/min. The temperature drops are only inevitable during transportation but can be dealt with when trucks reach their destination. By the time the trucks reach their destination, the total heat lost from the water and vaccine is 2×10^6J.

As a student with knowledge about heat quantity, help the medical team in charge of distributing the vaccine to determine its heat capacity and also help them know whether it will reach the health center when its effective.

Support

Assume that heat absorbed by the medicine container is negligible.

- Specific latent heat of fusion of ice = $3.36 \times 10^5 Jkg^{-1}$
- Specific latent heat of vaporization of steam = $2.3 \times 10^6 Jkg^{-1}$
- Specific heat capacity of water and ice are $4200Jkg^{-1}k^{-1}$ and $2100Jkg^{-1}k^{-1}$ respectively.

Item 6

(20 scores)